

Notice of Allowability

Application No.

10/781,169

Examiner

Ishwar (I. B.) Patel

Applicant(s)

LEE ET AL.

Art Unit

2841

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to March 8, 2006 and interview summary.
2. ☒ The allowed claim(s) is/are 1-8, 10-16 and 18.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413), Paper No./Mail Date 031506.
7. ☒ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Daniel R. McClure (Reg. 38,962) on March 15, 2006.

The application has been amended as follows: Amend the claims 1 and 11 as below:

Claim 1. (Currently amended): A substrate structure, comprising: a substrate with solder bumps on a main region and a peripheral region of a front side thereof; a solder mask formed over the front side of the substrate, wherein the solder bumps are exposed; and a metal trace structure formed within the solder mask; the metal trace structure including a channel therein for the receipt of underfill; the metal trace structure further including a central portion with arms radiating outwardly therefrom, dividing the solder mask into separate areas.

Claim 11. (Currently amended): A substrate structure, comprising: a substrate with solder bumps on a main region and a peripheral region of a front side thereof; a solder mask formed over the front side of the substrate, wherein the solder bumps are

exposed; and a metal trace structure formed within the solder mask; the solder mask including ~~a series of~~ the solder bumps not over the metal trace structure; the metal trace structure including a channel therein for the receipt of underfill; the metal trace structure further including a central portion with arms radiating outwardly therefrom, dividing the solder mask into separate areas.

2. The following is an examiner's statement of reasons for allowance: The patentability resides in the limitations "a metal trace structure formed within the solder mask" and "the metal trace structure including a channel therein; the metal trace structure further including a central portion with arms radiating outwardly therefrom, dividing the solder mask into separate areas", in combination with the other claimed limitations in the base claims 1 and 11. The prior art, taken alone or in combination does not fairly teach or suggest all the limitations or the structure arranged in the manner as claimed by the applicant.

The closest prior arts referred below do not recite the claimed combination of the substrate structure:

The prior art of Onodera (US Patent No. 6,600,217), in figure 1-3, discloses a channels but the channel are formed in the main the substrate. Onodera does not disclose the channel in the mask with the trace structure with the trace structure dividing the solder mask into separate areas or the solder bumps on the main region and on a peripheral region as claimed the applicant.

The prior art of Iwasaki (US Patent No. 6,777,814), in figure 4A, discloses dummy channel formation but does not disclose the channel formed in the mask along with trace structure dividing the solder mask into separate areas or the solder bumps on the main region and on a peripheral region as claimed by the applicant.

3. Drawings filed on March 8, 2006 are accepted by the examiner.

4. Claims 6 and 14, previously withdrawn from consideration as a result of specie restriction, is hereby rejoined and fully examined for patentability, as both the claims depend on claims 1 and 11 respectively and include all the limitations of the allowable claims 1 and 11 respectively.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ishwar (I. B.) Patel whose telephone number is (571) 272 1933. The examiner can normally be reached on M-F (8:30 - 5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (571) 272 1957. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

IB Patel

Ishwar (I. B.) Patel
Patent Examiner
Art Unit: 2841
March 15, 2006